

# TPHS Course Profile

## Calculus III (SDSU Math 252 Calculus III)

Open to any grade level for students who have received a "3" or higher on the Advanced Placement (AP) Calculus BC Exam or a "C" or higher in Calculus II (5 Credits)



- *Students earn college credits for this course through either San Diego State University or MiraCosta College. The class is taught at TPHS as part of the regular school day. It is recommended that students do not earn high school credits for this class. Details will be explained in class or see [www.abbymath.com/SDSU](http://www.abbymath.com/SDSU).*

### General Information

#### Description

In Calculus III, students will learn concepts such as:

- Vectors and Graphs in Three-Dimensions
- Partial Derivatives
- Multiple Integrals
- Vector Fields and Vector Calculus

#### Expectations and Goals

Students must have a "3" or higher on the Advanced Placement (AP) Calculus Exam or a "C" or higher in Calculus

- Indicators of potential success in Calculus III include test scores near or above the following values
  - Advanced Placement in Calculus BC Exam: 4 or 5
  - Students who score a "3" on the above exam are eligible for Calculus III, however they may find more success in Calculus II. (Students are eligible for Calculus III if they score a "3" or higher for the AB sub-score of the AP Calculus BC Exam)

Students entering Calculus III should *already* have a good understanding of the following concepts:

- Limits (graphically, numerically, and finding them algebraically).
- Derivatives of all functions (including trigonometric, inverse trigonometric, exponential, and logarithmic functions).
- Integration of standard functions (including all trigonometric functions) and using advanced techniques such as integration by parts and trigonometric substitution.
- Students also need to know parametric equations, polar coordinates and graphs, equations and graphs of conic sections, and how to find the trigonometric and inverse trigonometric values corresponding to each standard angle on the unit circle *without a calculator or note sheet*.

Students Entering Calculus III should be also be able to solve problems such as

<p><u>Derivative Problem:</u> Find</p> $\frac{d^2}{dx^2} [\ln(\sqrt{16 - x^2 - a^2})]$	<p><u>Integration Problem</u> Solve</p> $\int_1^4 \sqrt{t} \ln t \, dt$
<p><u>Graphing Problem:</u> Sketch the graph for each of the following:</p> <p>a) <math>\frac{x^2}{9} - \frac{y^2}{25} = 1</math>      c) <math>\frac{x^2}{9} + \frac{y^2}{25} = 1</math>  b) <math>-\frac{x^2}{9} + \frac{y^2}{25} = 1</math>      d) <math>\frac{x}{9} - \frac{y^2}{25} = 1</math></p>	<p><u>Parametric and Polar Problem:</u> Sketch the graph of the given polar equation by first converting to a Cartesian equation.</p> $r = \tan \theta \sec \theta, 0 \leq \theta \leq \frac{\pi}{4}$ <p>Write a set of parametric equations, including a domain for the parameter t, that graphs the same curve</p>

Students entering Calculus III are expected to do the following things:

- Keep up with daily assignments without a daily check from the teacher.
- Work with classmates to solve problems and understand concepts.
- Prepare projects outside of class and give presentations in front of peers.
- Solve complex problems without the use of a calculator or note sheet.

### Estimated Homework

Students will be expected to spend an average of approximately 2 to 3 hours outside of class on homework for each class period. Approximately 1 section from the text will be covered per class and one chapter every 4 weeks. (A student's individual ability level and competency may affect the actual preparation times needed.)

There may also be projects such as

- Presentations to the class
- Computer activities with the program Mathematica

### This Class Is Best For...

Calculus III is a rigorous college course. Students are expected to spend significant amounts of time completing and understanding assignments, preparing projects, studying for exams, and reviewing material each week. As in most college courses, students in Calculus III have only a few opportunities to demonstrate understanding on tests and projects, therefore each assessment will have a significant impact on a student's grade.

Note that students who do not need the additional units for high school graduation are strongly encouraged to have the Calculus III course NOT appear on their high school transcripts. This makes it much more likely for colleges to accept the transfer units. More details are given in class.

## Course Materials

### Required Materials

Text book: *Calculus: Early Transcendentals*, 6th edition, Brooks/Cole 2007, Stewart.

### Internet resources

- AbbyMath.com